Effectively Improving Technique of Developing Swimmers

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• *Traditional swimming training does not result in positive changes in technique¹,²

• ‘Deliberate practice’ strategies are essential to develop expert skill performance³

• *Deliberate practice in swimming can result in significant technique improvements⁴,⁵,⁶

*When compared over a 4-8 week macrocycle

Forces in Surface Swimming

- Must minimize resistive drag forces to fully realize future gains in propulsion
Quantifying Swimming Technique

– Passive Drag
  • Resistance produced during gliding
  • Quantified using towing techniques & computer simulations

– Active Drag
  • Resistance produced by swimmer moving through the water
  • Quantified using tethered or towing techniques & computer simulations

– Propulsive forces
  • Amount of force imparted by the swimmer onto the water during a stroke cycle
  • Quantified using pressure sensors & computer simulations
Purposeful Practice

• Clear Instructions
• Appropriate Task Difficulty & Complexity
• Sufficient number of Repetitions
• Appropriate Task Variety
• Effective Feedback
• Evaluate

Clear Instructions

Clear Instructions

Inge de Bruijn at 25 m of Her Silver Medal
100 m Freestyle Race at the
2004 Athens Olympic Games

http://coachsci.sdsu.edu/swim/champion/idb10025.htm
Clear Instructions

Underwater and Breakout Checklist:

- Glide before first kick/underwater pull
- Small, fast kicks (like a fish)
- Kick in both directions!
- Maintain strong streamline position
- Maintain kick tempo through breakout (or quickly transition to flutter kick)
- Begin first pull with your bottom hand
- Maintain a neutral head position during streamline and breakout
Complexity

**Blocked Practice:** practicing one skill continuously for a set of practice attempts before practicing another skill (i.e. practice dives and swimming separately)

**Random Practice:** Alternating between two or more skills or variations on each practice attempts (i.e. practice dives and swimming together)

- Blocked practice more effective for beginners or for new skills\(^1\)
- Random practice more effective for intermediate-advanced swimmers or familiar skills\(^1\)
- Difficulty needs to increase as skill level increases\(^2\)

Repetitions

• Require many _perfect_ repetitions to effect a change

• Practice capacity depends on development level\(^1\)

  – _Be aware of mental fatigue_ (i.e. unable to execute desired technique)

  – Plan for and provide appropriate mental and physical breaks

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Variety

• Teach to a variety of learning styles (VARK)$^{1,2}$
• Multi-modal approach to teaching technique (videos, pictures, checklists, classroom/poolside instruction, kinesthetic tools, etc.)$^{1,2}$
• Avoid too much variety in a single session (conflicts with repetition)$^{1,2}$

Feedback

- Augmented feedback better than conventional learning techniques\(^1\)
- Focus on positive aspects of a performance\(^2,3\)
- Concurrent feedback best for short term performance gains, poor for long-term retention\(^4,5\)
- Delayed feedback best for long-term retention, poor for short term performance gains\(^6\)
- ↑ feedback frequency for complex skills, ↓ for simple skills\(^7\)
- Feedback reliability more important than specificity or accuracy\(^8,9,10\) (accuracy becomes more important as skill level ↑\(^11\))
- External focus cues better than internal\(^1\)

Evaluation

• Evaluate technique by referring back to models
• Demonstrate improvements over time
  – Checklists, pictures, videos, etc.
• Evaluate your programming
  i.e. Did streamline glides improve after 6-week focus?
• Don’t just rely on speed/times as improvements can also be due to growth, physical development, etc.
Coach Tips

• Cues and drills appropriate for the cognitive and physical development and skill level of the swimmer
• Difficulty needs to increase as skill level increases
  – Stack learned skills
• Use your resources
• Vary your perspective
• Refer back to your models
• Ensure athletes remain focused on the task
• Avoid over-coaching
Example #1

14-year old backstroker recovers arms to side:
Cue: “See arm recover toward ceiling”

Set 1*: $n \times 16 \times 25$ Drill $^\wedge @30/45$
100 play

Feedback: - Review head-on video after even 25s
- Provide focus cues to help direct attention
- *Practice, think, watch/assess, repeat*

*Structure is very simple in early stages*
Example #1

14-year old backstroker recovers arms to side:
Cue: “See arm recover toward ceiling”

Set 2*: $n \times 12 \times 25$ Drill $^\uparrow @30/45$
2 x 50 Swim @1:00/1:30, >6 UDK
100 play

Feedback:  
- Review head-on video after even 25s & 2$^{nd}$ 50  
- Provide focus cues to help direct attention  
- *Practice, think, watch/assess, repeat*

*If improvement seen then add complexity/challenge*
Example #2

24x 11 & 12 swimmers, developing catch-phase in freestyle

Drill: Dog-Paddle Catch Drill – Focus on establishing catch position

Cue: “See fingertips point toward pool bottom”

Set 1*: 4x 2x 25 Drill^ head-up @1:00, :15 apart
6x 25 Drill^ head-down @1:00, :15 apart

Feedback:
- Show video of expert to group
- 2x25 internal cues (visual from swimmer)
- 6x25 swimmers watch the next swimmer from UW & provide feedback (rotate positions each round)
  - Remind group every round with appropriate focus cues

*Structure is very simple in early stages
Example #2

24x 11 & 12 swimmers, developing catch-phase in freestyle

Drill: Dog-Paddle Catch Drill – Focus on establishing catch position
Cue: “See fingertips point toward pool bottom”

Set 2*: 4x
2x 25 Drill^ head-up @1:00, :15 apart
3x 25 Drill^ head-down @1:00, :15 apart
3x 25 Swim with perfect catch @1:00

Feedback:
- Show video of expert to group
- 2x25 internal cues (visual from swimmer)
- 6x25 swimmers watch the next swimmer from UW & provide feedback (rotate positions each round)
- Remind group every round with appropriate focus cues

*Swimmers that demonstrate success integrate into swim for last 2x25 at coach discretion